

# Notice of Allowability

Application No.

10/772,643

Examiner

Farhan M. Syed

Applicant(s)

STAGER ET AL.

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--  
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/8/07.
2. ☒ The allowed claim(s) is/are 1,3-18,20,21,23,25,26 and 28-38.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached  
1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.  
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date (See Office Action)
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

/FMS

### **DETAILED ACTION**

1. Claims 1, 3-18, 20, 21, 23, 25, 26, and 28-38 are pending.
2. Applicant's amendments and arguments filed on 08 November 2007 have been fully considered and they are deemed to be persuasive.

### ***Information Disclosure Statement***

3. The information disclosure statements (IDS) submitted on 10 August 2007 and 17 December 2007 are being considered by the examiner.

### **EXAMINER'S AMENDMENT**

4. Authorization for Examiner's Amendment to the amendment filed 08 November 2007 was given by Steven Gellman (Reg. No. 41,034) in a telephone interview on 07 February 2007.
5. An examiner's amendment to the amendment filed 08 November 2007 appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
6. The application has been amended as follows:
  1. (Currently Amended) A method for providing continuous data protection, the method comprising the steps of:

writing data to a primary volume;  
duplicating the writes made to the primary volume to a second volume in a sequential fashion, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume; and  
identifying any point in time (APIT) window wherein all writes to the secondary volume are maintained so that within the identified APIT window, the primary volume may be restored to any previous point within the APIT window;  
creating a block-ordered mapping data structure to track changes in the data written to the secondary volume between two points in time; and  
merging the mapping data structure that protect contiguous points in time, whereby fewer mapping data structures are needed to protect the data between the same two points in time spanning the merged mapping data structures.

10. (Currently Amended) A method for operating a data protection system for a protected computer system, the method comprising the steps of:  
tracking writes made to a primary volume;  
duplicating the writes to the primary volume in a sequential fashion on a secondary volume, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume;  
organizing a mapping of the writes between the primary volume and the secondary volume into a block-ordered data structures, wherein the data structures enable the primary volume to be restored at any point in time;

identifying any point in time window wherein the data structures are maintained so that within the identified time window, the primary volume may be restored at any point within the time window; and  
merging the data structures that protect contiguous points in time, whereby fewer data structures are needed to protect the data between the same two points in time spanning the merged data structures.

14. (Currently amended) A system for providing continuous data protection, the system comprising:

a host computer;

a primary volume for storing data written by the host computer;

a secondary volume wherein writes made to the primary volume are sequentially duplicated onto the secondary volume, the secondary volume containing a chronological ordering of all writes made to the primary volume; and

a data protection system configured to:

manage the duplication of writes to the secondary volume;

map data between the primary volume and the secondary volume using a block-ordered data structures, wherein the data structures are maintained so that within an established time window, the primary volume may be restored to any point within the time window; and

merge the data structures that protect contiguous points in time, whereby fewer data structures are needed to protect the data between the same two points in time spanning the merged data structures.

20. (Currently Amended) A computer-readable storage medium containing a set of instructions for a general purpose computer, the set of instructions comprising: a tracking code segment for tracking writes made to a primary volume; a duplicating code segment for duplicating the writes to the primary volume in a sequential fashion on a secondary volume, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume; an organizing code segment for organizing a mapping of the writes between the primary volume and the secondary volume into a block-ordered data structures, wherein the data structures enable the primary volume to be restored to any point in time; an identifying code segment for identifying any point in time window wherein the data structures are maintained so that within the identified time window, the primary volume may be restored to any point within the time window; and a merging code segment for merging the data structures that protect contiguous points in time, whereby fewer data structures are needed to protect the data between the same two points in time spanning the merged data structures.

21. (Currently Amended) A method for enabling data recovery from a primary volume in a contiguous data protection system, comprising the steps of:  
creating an initial copy of the primary volume;  
after the initial copy is made, duplicating each write to the primary volume to a write log to be stored on a secondary volume, the write log being written to the secondary volume when the write log is full, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume;  
creating a snapshot of the primary volume, the snapshot being a point in time to which the primary volume can be stored;  
creating a block-ordered data structure to track the writes made to the secondary volume, the data structure being derived from the write log and containing the writes made to the primary volume between two points in time; and  
merging the data structures that protect contiguous points in time, whereby fewer data structures are needed to protect the data between the same two points in time spanning the merged data structures.

35. (Currently Amended) A currently implemented method for continuously protecting data stored on a volume of a storage system, comprising:  
writing data to a primary volume in a block-based order;  
duplicating the data to a write log in a sequential order;  
creating a block-ordered mapping data structure from the write log, the block-ordered mapping data structure stored on a secondary volume and used to track

changed in the data between two points in time, whereby the data is continuously protected; and merging the mapping data structure that protect contiguous points in time, whereby fewer mapping data structure are needed to protect the data between the same two points in time spanning the merged mapping data structures.

***Allowable Subject Matter***

7. Claims 1, 3-18, 20, 21, 23, 25, 26, and 28-38 and renumbered 1-33 are allowed over the prior art of record.

***Reasons For Allowance***

8. The following is an examiner's statement of reasons for allowance:

9. Regarding independent claims 1, 10, 14, 20, 21 and 35, Applicants particular methods, associated systems, and associated article of manufacture of providing continuous data protection comprising: creating a block-ordered mapping data structure to track changes in the data written to the secondary volume between two points in time; and merging the mapping data structure that protect contiguous points in time, whereby fewer mapping data structures are needed to protect the data between the same two points in time spanning the merged mapping data structures, was not disclosed by, would not have been obvious over, nor would have been fairly suggested by the prior art of record. The closest prior art Kedem (U.S. Patent 6,725,331) teaches writing data to a primary volume; duplicating the writes made to the primary volume to a

secondary volume in a sequential fashion, wherein the secondary volume contains a chronological ordering of all writes made to the primary volume; and identifying an any point in time (APIT) window wherein all writes to the secondary volume are maintained so that within the identified APIT window, the primary volume may be restored to any point within the APIT window. Other relevant prior art teaches the general concept of providing continuous data protection: McCabe, Ron et al (U.S. Patent Pub. 2002/0016827), Stager, Roger et al (U.S. Patent Pub. 2005/0193272), and Stager, Roger et al (U.S. Patent Pub. 2005/0171979)

The dependent claims, being further limiting to the independent claims, definite and enabled by the specification are also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farhan M. Syed whose telephone number is 571-272-7191. The examiner can normally be reached on 8:30AM-5:00 PM.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christian Chace can be reached on 571-272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/FMS

A handwritten signature in black ink, appearing to read 'Chace', is positioned above the printed name and title.

CHRISTIAN CHACE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100